Chapter 7

Renewable Energy Sources Development in Rural Areas of African Countries

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ABSTRACT

The prospects of increasing access to electricity for the population of rural areas of Africa are considered. The main international funds and organizations aimed at sustainable energy development in Africa are described. An analysis of the state and possible options for using renewable energy sources for this purpose in decentralized energy supply through the creation of mini-grids or stand-alone systems is given. The risks by developing renewable energy sources in rural areas and modern mechanisms for financing in solar energy are presented.

INTRODUCTION

In the 21st century, the use of renewable energy sources (RES) is stimulated in economically developed countries by the desire for environmentally oriented energy development and the need to ensure energy security of states. In developing countries, the development of renewable energy resources is the determining lever for overcoming poverty and stimulating the development of the economies of these states. The carbon-free path of energy development in Africa is an important contribution to solving such problems of global warming, greenhouse gas emissions, forest destruction. The problem of access to electricity is one of the priority conditions for the economic and social development of African countries. In African countries with high potential resources of renewable energy, development of renewable

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energy resources is an important factor of social and economic development of these countries, increase of energy and economic independence, as well as a lever to overcome the spatial heterogeneity of the population’s access to electricity, improve ecological conditions and fight against deforestation. The problem of low people’s electricity access in rural Africa is one of the most acute problems of our time. About 600 million rural people do not have access to grid electricity, of which 98% are concentrated in the Sub-Saharan region (IEA, 2014). Access to electricity is extremely low: as of 2016 - on average in Sub-Saharan Africa (SSA) – 43%. In 30 countries, the indicator is between 11 to 39%, and in 10 countries - less than 10% (WB DATA, 2016). Rural population spend about US$14 billion each year on lighting and mobile phone charging with kerosene, candles, batteries or other fossil fuel-powered technologies. That is very expensive, hazardous, polluting and harmful to health (SEAR, 2017).

In rural areas of SSA countries, the level of electrification does not exceed 10%, while in general in developing countries this figure has increased in recent years to 50% (IRENA, 2017a). The most important problems of sub-Saharan Africa are the shortage of electricity generation and the weak development of the energy infrastructure, which deprives rural residents of access to electricity. Africa has the world’s lowest per capita energy consumption: with 16% of the world’s population (1.18 billion people out of 7.35 billion) it consumes about 3.3% of global primary energy. With current trends, it will take Africa until 2080 to achieve full access to electricity. Energy from biomass accounts for more than 30 per cent of the energy consumed in Africa and more than 80 per cent in many sub-Saharan African countries. Indoor pollution from biomass cooking — a task usually carried out by women — will soon kill more people than malaria and HIV/AIDS combined. Nearly 60 per cent of refrigerators used in health clinics in Africa have unreliable electricity, compromising the safe storage of vaccines and medicines; half of vaccines are ruined due to lack of refrigeration (UNEP, 2017). The poorest African households spend 20 times more per unit of energy than wealthy households when connected to the grid Power supply even in cities is characterized by frequent outages and interruptions, which requires the installation of duplicating diesel generators. Electric transmission lines are in a dilapidated state and are characterized by losses 2-3 times higher than the standards. Economic development and access to energy are connected very closely. Improving electricity supply and distribution boosts economic growth, creates jobs, and expands the reach of educational and health services (AFREA, 2014). Foreign companies of economically developed countries are interested in the technology transfer and technical participation in the construction of such energy projects, created primarily with considerable investment support from international financial and environmental funds. At the household and community scale, distributed renewable energy (DRE) technologies include small-scale solar PV and stand-alone lighting systems; wind, biodiesel generators, and micro- and pico-hydro stations for electricity generation; and solar and biomass heating and cooling units and cooking devices. Many of these technologies provide productive or mechanical energy for commercial purposes as well. For the purposes of this section, renewable energy-based micro- and mini-grids also qualify as DRE technologies.

A number of international environmental and financial organizations, individual developed countries of the world, carry out programs to support the use of renewable energy sources in Africa, mainly in the poorest region of the continent - Sub-Saharan Africa (Tab. 1. Some Programmes furthering energy access in Africa by RES development). Of great importance is Global Initiative of former UN Secretary-General Ban Ki-moon - Sustainable Energy for All (SE for ALL) - with three objectives for 2030: achieving universal access to electricity and clean cooking solutions; doubling the share of the world’s energy supplied by renewable sources; and doubling the rate of improvement in energy efficiency.